

# The Technology of Differentiated Physical Education of Primary-Age Pupils

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## Abstract

The technology of physical education of primary-age pupils, based on the consideration of their typological characteristics, contributes to a significant improvement of health status, increases the level of physical abilities, mental and physical performance, and enhances motion activity. It is more effective as compared to traditionally applied physical and sporting technologies at secondary educational institutions.

The distribution of means for physical education with consideration of the pupils' body type, dosing physical loading with account of the individual levels of biological development and physical preparedness, the use of multi-level motion patterns with a glance to health status and type of motor development, and introduction of standards for physical fitness based on body mass index can significantly increase the effectiveness of physical education of primary-age children, attract them to regular physical exercising, and contribute to implementation of physical training as an important component of a healthy way of life. *Purpose of the research:* the goal of present research is to substantiate and develop the technology of differentiated physical education of primary-age pupils at gymnasiums and lyceums based on consideration of their typological characteristics.

**Keywords:** differentiated physical education, primary-age pupils, typological characteristics, type-specific means, methods and forms, health standard, physical fitness

## 1. Introduction

The last decade in Russia is noted by further worsening of health status and level of physical fitness of schoolchildren, manifestation of disharmony in their physical development, and a significant decrease in their physical performance (Abramishvili, 2014, pp. 7-12; Wilenskaya, 2006; Glazun, 2006; Ponomarev, 2006). This negative trend requires making radical changes in the process of physical education at schools, beginning with elementary grades.

Taking the classes on physical culture, children have different levels of health, physical fitness, theoretical and mental readiness to address the major problems of the educational process (Abramishvili, 2014, pp. 7-12; Bortsova, 2006; Ermakov, 1996).

The generalized choice of means for physical education and the averaged metering method of exercise load, which are apparently prevalent in physical education at school, do not allow one to take into account child's individuality, making physical activity excessive for some children, while insufficient for others (Abramishvili, 2014, pp. 7-12; Berezina, 2003; Karpov, 2011, pp. 113-117; Kuznetsov, 2007, p. 38). It is possible to eliminate these disadvantages in the course of class and extracurricular forms of physical education if taking into account orientation of child's motor development, his natural predisposition to a certain type of motor activity, distributing children into typological subgroups (Aksenov, 2006; Dobrydin, 1998; Kainov, 2005; Spirin, 2008, pp. 11-13). Specialists recommend to differentiate pupils' physical education considering and analyzing the following criteria: the pattern of motility (Blinkov, 2000), evaluation of morphological characters (Guba, 2010), the peculiarities of physical qualities development (Burlykov, 2006; Ermakov, 1996; Loroshkova, 1996), body-type affiliation (Aksenova, 2006; Karpov, 2011, pp. 113-117; Ponomarev, 2006), level of motor actions technique (Dobrydin, 1998; Kuznetsov, 2007, p. 38; Loroshkova, 1996), typological control methods (Kainov, 2005), harmonious features of physical development (Bobkova, 2006), the specificity of physical fitness

indicators structure (Bortsova, 2006), and the choice of a certain sport (Tiyunaytis, 2010).

To improve the efficiency of physical education of primary-age pupils at general educational institutions it is necessary to change substantially the content of the physical education classes, making them more attractive, accessible and interesting, to use type-specific means of physical education for the development of physical abilities and the formation of motional skills, to teach children independent physical exercising, which is more peculiar to them, and to form the basis of relevant knowledge (Abramishvili, 2014, pp. 7-12; Aksonov, 2006; Lapitskaya, 2010, pp. 19-23; Tiyunaytis, 2010). To date the lack in understanding of the noted interrelation is one of the main reasons for the low athletic activity of pupils and deficiency of proper manifestations of physical culture in their lifestyle.

We have formulated scientific problem, which is focused on improving differentiated physical education of primary-age pupils based on consideration of their typological features and use of type-specific means, techniques and forms of physical education aimed at improving the level of health, physical fitness, and interest in physical exercising. The solution of the noted scientific problem seems appropriate based on consideration of trained pupils' typological characteristics.

## 2. Research Organization

The study was carried out based on municipal educational budgetary institutions of Sochi. The conducted experiment involved 522 pupils at the age of 7-10 years. The basic pedagogical experiment involved 72 pupils at 8-9 years of age (36 children both in control and experimental groups).

Implementation of described technology was carried out in the following directions: *the first* - content of pupils' physical education in the course of physical training, extra-curricular sports activity, and independent exercising; *the second* - regulatory and criterial indicators of physical fitness, and *the third* - availability of training documentation and qualification of pedagogical staff.

Differentiated physical education technology includes four blocks:

1. Projective block, consisting of target instructions, basic goals and objectives, and expected results.
2. Conceptual block, consisting of basic, additional, and auxiliary means of physical education.
3. Procedural block, consisting of scientific and methodological recommendations on the use of physical education means.
4. Control and recording block, consisting of assessment of physical fitness indicators.

The main forms of physical education of primary-age pupils, used in this educational project, include:

1. Training classes on physical education, held three times a week, each lasting 40 minutes, organized in a three-part structure (preparatory, basic, and final parts). The content of the classes is regulated by the State Comprehensive Program of 2006 (Lyakh & Zdanevich, n. d.).
2. Timeouts and minutes of physical activity, held during classes over 1.5-2.0 minutes, using basically gaming and simulation techniques.
3. The mobile games at recess, where the organized (by teachers and high school pupils) and independent forms of physical education were used.
4. Sporting entertainment, mobile and game-oriented sports, including play, imitation and competition as the main methods.
5. Topical sporting events, organized during 1-2 hours each academic term.
6. Sports class of 40 minutes' length held only within the third level of motion activity.
7. Swimming was held once a week.
8. Sports competitions were carried out according to the moral support activity timetable.
9. Day-long walking tour.
10. "Health Days" held 4-5 hours each year.
11. Various sports sections (football, combat sport, gymnastics, swimming, and athletics).
12. Rhythmic gymnastics was conducted by Youth Sports School teacher after the end of the fourth class (once a week).
13. Fresh air and exercise were scheduled for a time after completing homework assignments.

14. Independent physical activity was scheduled by pupils with the help of parents and teachers, and was reflected in their personal control grade book.

The following sequence of operations and actions was established:

1. Determination of the pupil's physical development level (low, below average, average, above average, and high).
2. Assessment of the pupil's physical fitness level (low, below average, average, above average, and high).
3. Assessment of the health status, selecting the first (no chronic diseases) or the second (presence of chronic diseases) health groups.
4. Estimation of body type, distinguishing thoracal, muscular, asthenical, and digestive types.
5. Assessment of the biological development level, distinguishing retarded, normal, and accelerated types.
6. Selection of the most effective independent physical exercises in terms of the content and organization. When evaluating motion activity of these exercises, the following characteristics were taken into account: the length of physical exercising per week; motion activity indicators, optimal pulse motor performance mode; physical exercising methods and fitness organization forms; as well as physical education means. We have chosen effective physical exercises for each typological group of exercisers involved.

### 3. Experimental Methodology

Exercisers engaged in the experimental group were divided into subgroups depending on their gender identity, levels of physical development, physical fitness, body constitution, level of biological development, and health status. For them special range of exercises were developed. These exercises consisted of five main blocks: exercises to develop speed, power and coordination abilities, endurance, and flexibility. The exercises were chosen taking into account the constitutional features and levels of biological maturity of the exercisers' organism.

Exercises for the pupils of the experimental group were distributed into the following main blocks: *the first block* contained the exercises to develop physical abilities and form basic motional skills at physical education classes; *the second block* contained the exercises performed during timeouts and minutes, during games and recesses; *the third block* contained the exercises used in sectional work; *the fourth block* referred to pupils' independent exercise training; and *the fifth block* represented home training.

Each pupil of the experimental group was given guidelines for the development of physical abilities with due consideration of his typological features.

In the course of differentiated physical education of the pupils, the following basic principles were used:

- Joined development of basic physical abilities and the most important motional skills in pupils of each typological group;
- Proportionate development of physical abilities for the pupils of each typological group;
- Implementation of sports reserve training technologies into the process of pupils' physical training.

The effectiveness of the pupil's physical education process was determined under the following conditions:

1. Ensuring the optimal type-specific occupation of pupils.
2. Carrying out the permanent type-specific adjustment of pupils' exercise load.
3. Using a sufficient variety of sports equipment and a wide range of training tasks for exercisers of each typological group.
4. Providing insurance and assistance during exercising, engaging assistants from among the best-trained classmates.

Pupils' differentiated physical education includes the following requirements:

- Exercises should be affordable for the exercisers of each typological group;
- The effect of exercises should be diversified;
- Exercisers' activities should be diverse in terms of content and nature of the impact, they should be aimed at enhancing thinking and understanding of performed motion activities;
- The means, methods and organizational forms to develop physical qualities must be adequate to the exercisers' peculiarities, as well as necessary lesson conditions and teacher's qualification.

Each pupil of the experimental group was provided by physical fitness and training diagram, which determined basic physical exercises to correct development patterns of their physical qualities, the parameters and components of physical load were selected, and effective training means for self-exercise were suggested.

Exercisers recorded in a personal card the results of the regulatory indicators credits on physical training, obtained during the classes and in the course of doing homework, which served the basis for adjustment of individual physical activity at physical culture classes and independent physical training.

The computer program allowed us to perform statistical processing of the obtained results, bring to monitor a list of exercisers, classify them depending on the levels of physical development, physical fitness, health status, body constitution, and the features of biological development.

#### 4. Research Results

During the exploration term it was revealed that differentiated physical education of pupils had a significant impact on the functionality of their cardiovascular system. Heart rate indicators were significantly improved in both groups of pupils: in boys of the experimental group by 5.5% ( $p < 0.01$ ); in girls - by 3.8% ( $p < 0.05$ ); in boys of the control group by 2.2% ( $p < 0.05$ ); in girls - by 2.0% ( $p < 0.05$ ). The final inspection revealed intergroup authenticity differences just in boys (5% confidence level). Reliable increase in time expiratory capacity was shown only by pupils of the experimental group: in boys - by 36.4% ( $p < 0.05$ ); in girls - by 33.2% ( $p < 0.05$ ).

During the exploration term the pupils of the experimental group showed a reliable increase in pulmonary capacity indicators (boys - by 17.6%,  $p < 0.05$ ; girls - by 17.1%,  $p < 0.05$ ). At that, boys (7.2%) and girls (6.7%) in the control group showed an insignificant change of the concerned indicators. In terms of pulmonary capacity, only boys revealed intergroup authenticity differences (5% confidence level) in the course of final examination.

During the exploration term the health rate of the pupils in the control group has changed insignificantly, while that of the pupils in the experimental group was credibly changed (boys - 1.6%,  $p < 0.05$ ; girls - 1.6%,  $p < 0.05$ ). Therefore, differentiated physical training of primary-age schoolchildren had a significant impact on the performance of their vegetative blood circulation, respiratory system, and health level.

Pupils of the experimental group (boys - 7.4%,  $p < 0.01$ ; girls - 7.9%,  $p < 0.01$ ) have substantially improved results in short-distance running on 30 meters. The final examination of the pupils in the experimental group revealed a more pronounced increase in the results of the standing long jump (boys - 11.3%,  $p < 0.05$ ; girls - 9.2%,  $p < 0.05$ ). A credible increase in the results of the shuttle run (3x10 m) was shown only by boys of experimental group (9.2%,  $p < 0.05$ ).

During the exploration term the indicators characterizing the staffed ball throwing have changed by 20.1% for boys from experimental group at a significance level of 1%. Those for arm pumping exercises at front leaning rest position increased by 16.2%. Girls of experimental group showed a significant increase just in staffed ball throwing (16.1%,  $p < 0.05$ ). Only girls from the experimental group revealed reliable performance gains when exercising forward inclination of body (21.4%,  $p < 0.05$ ). Running on 1,000 meters showed a significant increase in the results among the pupils of the experimental group (boys - 7.1%,  $p < 0.05$ ; girls - 6.7%,  $p < 0.05$ ). Therefore, in terms of physical ability levels, the pupils of experimental group have shown a marked improvement.

During the exploration term pupils in the experimental group have improved their performance in "Physical Education" (6.3%,  $p < 0.05$ ), while for the pupils in the control group this index remained unchanged (0.5%,  $p < 0.05$ ). Besides, the attendance ratio (7.5%,  $p < 0.05$ ) of physical training classes for pupils from the experimental group has credibly increased up to 96.1% (as compared to control group, where this indicator amounted for 86.1%).

The use of type-specific means of physical education, on the one hand, activates those children who are less prepared, and thus have difficulties when fulfilling program requirements at physical training classes, and on the other hand, allows many pupils to achieve better results in their health promotion, as well as to increase the level of physical fitness.

#### 5. Findings

The authors 'differentiated technology for physical education of primary-age schoolchildren, based on their typological features, was developed and tested in the experiment. It consists of projective, conceptual, procedural, control and recording blocks. Implementation of these blocks, in turn, is based on developed (in accordance with the typological features) fundamental principles, which include joined development of basic physical abilities and the most important motional skills of pupils in each typological group, proportionate development of

physical abilities, and the development of specific pedagogical conditions: ensuring optimal type-specific activity of exercisers, conducting a permanent type-specific adjustment of physical activity, wide choice of learning activities for dealing with each typological group, subject to the requirements of differentiated physical education: affordability of exercises for exercisers of each typological group, versatility of the physical exercises effect, a variety of contents and pressures, means, methods and organizational forms of classes, their adequacy to the peculiarities of the exercisers involved, to the terms of classes, and qualification of the teacher. The effectiveness of this technology was evaluated based on physical, cognitive, emotional, behavioral, and morphological criteria.

Innovative technology of differentiated physical education of primary-age pupils proved to be effective. Thus, physical fitness levels grow, pupils' attitude to the "Physical Education" subject improves, indicators of organized and spontaneous motor performance increase, the pupils show their interest to own level of physical fitness. Besides, the indicators of educational activities of schoolchildren advance.

## 6. Conclusions

The conducted study shows the need for future research, which is associated with improvement of the content of pupils' physical education at primary school.

In our view, the following areas should be considered a priority when conducting the research in physical training of primary-age pupils in the course of educational and extra-curricular activities:

- The definition of the required proportionality in development of physical qualities;
- The prediction of the achievable outcomes of physical education for each pupil;
- The development of effective means and methods of physical education for pupils of different typological groups;
- The development of physical education technology of the pupils based on their individual characteristics;
- The formation of cognitive activity in the course of the typological development of pupils' physical abilities.

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